

CLAIMS:

1. An electroluminescent device comprising a combination of a charge-transporting conjugated donor polymer and a phosphorescent acceptor compound dispersed in the donor polymer, the charge-transporting conjugated donor polymer having a conjugated chain including one or more odd-integer conjugated multivalent radical sub-units, each odd-integer conjugated multivalent radical sub-unit having a first and a second unsaturated radical site connecting the odd-integer conjugated multivalent radical sub-unit to a respective first and second adjacent conjugated sub-unit of the conjugated chain and a shortest uninterrupted path of unsaturated atoms connecting the first and the second radical site, the number of unsaturated atoms of the shortest path being an odd integer.

2. An electroluminescent device as claimed in claim 1, wherein the number of unsaturated atoms of the shortest uninterrupted path of at least one of the odd-integer conjugated multivalent radical sub-units is 1.

3. An electroluminescent device as claimed in claim 1 or 2 wherein the conjugated chain has more than one even-integer conjugated multivalent radical sub-units and the more than one even-integer conjugated multivalent radical sub-units are incorporated in the conjugated chain such that no two even-integer conjugated multivalent radical sub-units are connected to one another.

4. An electroluminescent device as claimed in claim 1, 2 or 3 wherein the conjugated chain has a plurality of odd-integer conjugated multivalent radical sub-units and any adjacent conjugated sub-unit which is connected to two odd-integer conjugated multivalent radical sub-units is itself an odd-integer conjugated multivalent radical sub-unit.

5. An electroluminescent device as claimed in claim 1, 2, 3 or 4 wherein each of the odd-integer sub-units of the conjugated chain has a size which is sufficiently small to enable the donor polymer to have a lowest-energy triplet level of an energy of about 20,000 cm⁻¹ or higher.

6. An electroluminescent device as claimed in claim 1, 2, 3, 4 or 5 wherein each of the one or more odd-integer sub-units of the conjugated chain has a total number of unsaturated atoms less than 20.

7. An electroluminescent device as claimed in claim 1, 2, 3, 4, 5 or 6 wherein the conjugated chain includes adjacent conjugated sub-units which are not odd-integer sub-units and each of such adjacent conjugated sub-units has a size which is sufficiently small to enable the donor polymer to have a lowest-energy triplet level of an energy of about 20,000 cm⁻¹ or higher.

8. An electroluminescent device as claimed in claim 1, 2, 3, 4, 5, 6 or 7 wherein the conjugated chain includes adjacent conjugated sub-units which are not odd-integer sub-units and each of such adjacent conjugated sub-units has a total number of unsaturated atoms less than 20.

9. An electroluminescent device comprising a combination of a charge-transporting conjugated donor polymer and a phosphorescent acceptor compound dispersed in the donor polymer, the charge-transporting conjugated donor polymer including a conjugated chain including one or more phenylene-based sub-units, each phenylene-based sub-unit having a first and a second radical site connecting the phenylene-based sub-unit to a respective first and second adjacent conjugated sub-unit of the conjugated chain, the first and the second unsaturated radical site being positioned relative to one another in a meta arrangement.

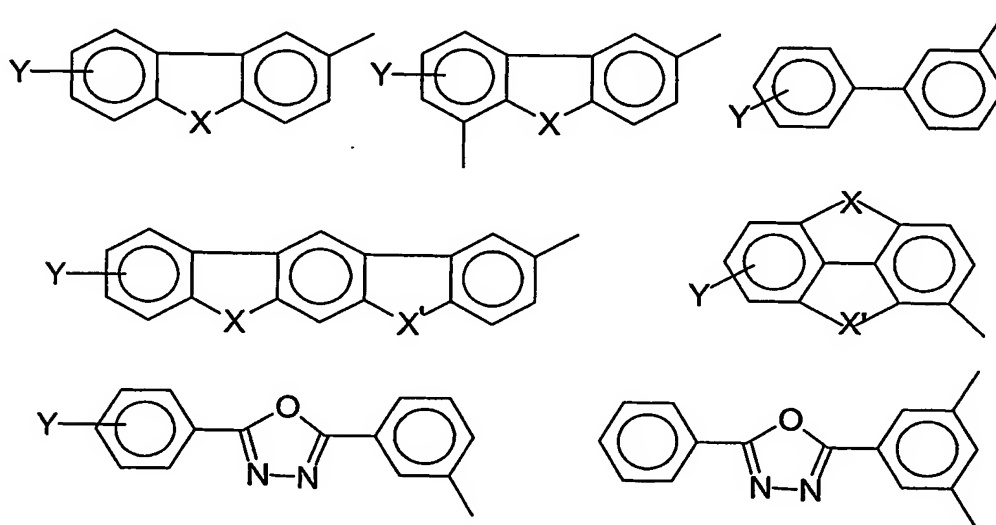
10. An electroluminescent device comprising a combination of a charge-transporting conjugated donor polymer having a lowest-energy triplet level with an energy of about 20,000 cm⁻¹ or higher and a lowest-energy singlet level which is at most 0.5 eV higher in energy than the lowest-energy triplet level, and a phosphorescent acceptor compound having a phosphorescent emission level with an energy of about 20,000 cm⁻¹ or lower.

11. An electroluminescent device comprising a combination of a charge-transporting conjugated donor polymer having a lowest-energy triplet level with an energy of about 21,000 cm⁻¹ or higher and a lowest-energy singlet level which is at most 0.5 eV higher

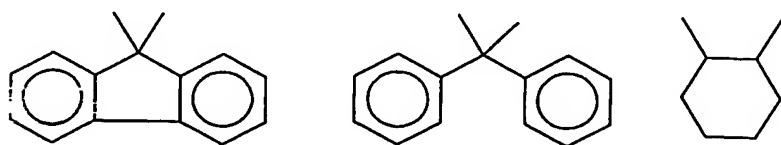
in energy than the lowest-energy triplet level, and a phosphorescent acceptor compound having a phosphorescent emission level with an energy of about 21,000 cm⁻¹ or lower.

12. An electroluminescent device as claimed in claim any one of the claims 1 to 11, wherein the donor polymer and the acceptor compound are integrated to form one integrated donor-acceptor polymer.

13. An electroluminescent device comprising a combination of a charge-transporting conjugated donor compound and a phosphorescent acceptor compound dispersed in the donor compound, the charge-transporting conjugated donor compound including a structural unit R in accordance with one of the formula



wherein Y is a single bond or a hydrogen, -X- or -X'- is, the same or different, -O-, -S-, -NH-, -CH₂- or -CH₂CH₂- or wherein -X- or -X'- is, the same or different, -CR'R'- wherein -CR'R'- together represent a cyclic structure in which the carbon atom is a spiro atom or wherein -X- or -X'- is, the same or different, -CR'HCR'H- with -CR'-CR'- together representing a ring system, monocyclic or polycyclic, such as fused polycyclic, saturated or aromatic or combination thereof, or wherein -X- or -X'- is, the same or different, a structural unit in accordance with one of the formula



or wherein $-X-$ or $-X'-$ is, the same or different, equal to C_1-C_{20} dialkylmethylene or $-NR^1-$ with R^1 is C_1-C_{20} alkyl or C_4-C_{12} aryl, such as phenyl, and wherein one or more aromatic $-CH$ units may be replaced with respective nitrogen atoms and wherein one or more hydrogen atoms may be replaced with respective non-hydrogen substituents.

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14. An electroluminescent device as claimed in claim 13, wherein the donor compound is a donor polymer having a conjugated chain comprising the structural unit R.

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15. An electroluminescent device as claimed in claim 13 or 14, wherein the donor compound and the acceptor compound are integrated to form one integrated donor-acceptor compound.

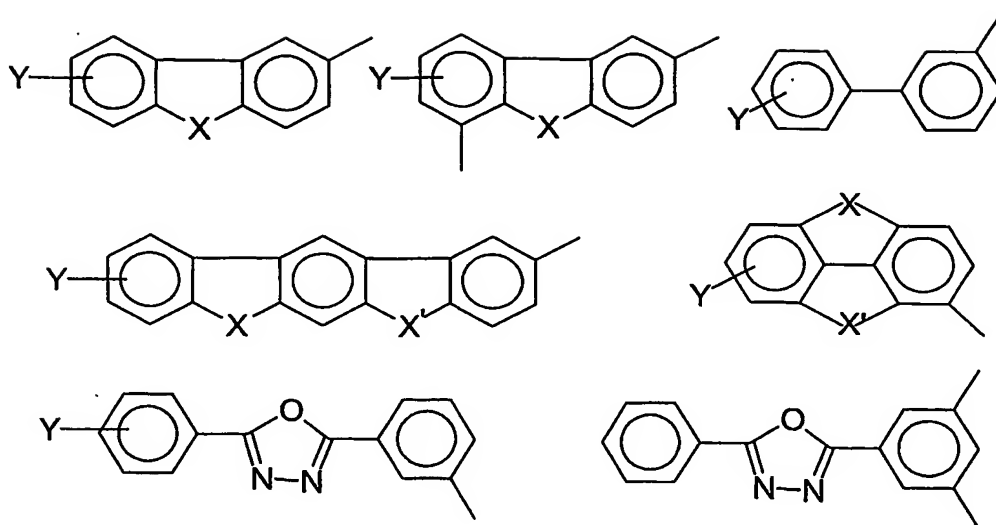
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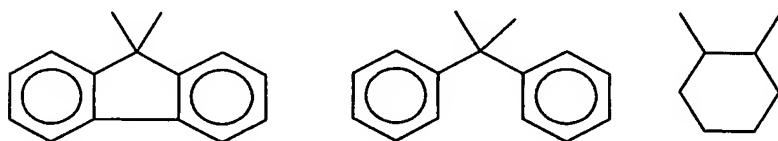
16. A combination of a charge-transporting conjugated donor polymer and a phosphorescent acceptor compound dispersed in the donor polymer, the charge-transporting conjugated donor polymer having a conjugated chain including one or more odd-integer conjugated multivalent radical sub-units, each odd-integer conjugated multivalent radical sub-unit having a first and a second unsaturated radical site connecting the odd-integer conjugated multivalent radical sub-unit to a respective first and second adjacent conjugated sub-unit of the conjugated chain and a shortest uninterrupted path of unsaturated atoms connecting the first and the second radical site, the number of unsaturated atoms of the shortest path being an odd integer.

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17. A combination of a charge-transporting conjugated donor compound and a phosphorescent acceptor compound dispersed in the donor compound, the charge-transporting conjugated donor compound including a structural unit R in accordance with one of the formula



wherein Y is a single bond or a hydrogen, $-X-$ or $-X'-$ is, the same or different, $-O-$, $-S-$, $-NH-$, $-CH_2-$ or $-CH_2CH_2-$ or wherein $-X-$ or $-X'-$ is, the same or different, $-CR'R'-$ wherein $-CR'R'-$ together represent a cyclic structure in which the carbon atom is a spiro atom or
 5 wherein $-X-$ or $-X'-$ is, the same or different, $-CR'HCR'H-$ with $-CR'-CR'-$ together representing a ring system, monocyclic or polycyclic, such as fused polycyclic, saturated or aromatic or combination thereof, or wherein $-X-$ or $-X'-$ is, the same or different, a structural unit in accordance with one of the formula

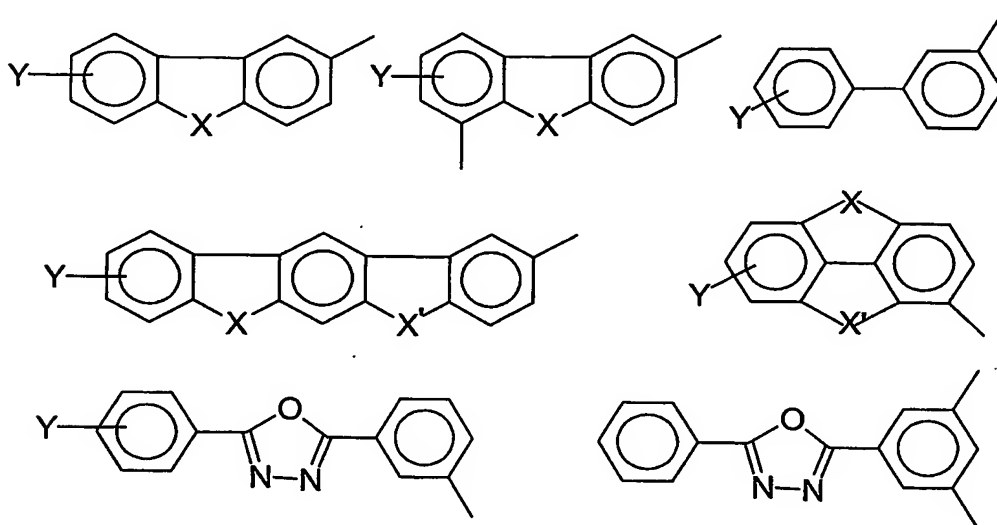


10 or wherein $-X-$ or $-X'-$ is, the same or different, equal to C_1-C_{20} dialkylmethylene or $-NR^1-$ with R^1 is C_1-C_{20} alkyl or C_4-C_{12} aryl, such as phenyl, and wherein one or more aromatic $-CH$ units may be replaced with respective nitrogen atoms and wherein one or more hydrogen atoms may be replaced with respective non-hydrogen substituents.

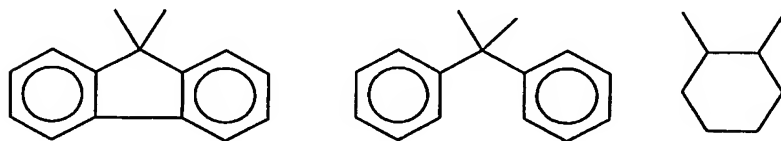
15 18. Use of a charge-transporting conjugated donor polymer in a combination of a charge-transporting conjugated donor polymer and a phosphorescent acceptor compound dispersed in the donor polymer, the charge-transporting conjugated donor polymer having a conjugated chain including one or more odd-integer conjugated multivalent radical sub-units, each odd-integer conjugated multivalent radical sub-unit having a first and a second
 20 unsaturated radical site connecting the odd-integer conjugated multivalent radical sub-unit to a respective first and second adjacent conjugated sub-unit of the conjugated chain and a

shortest uninterrupted chain of unsaturated atoms connecting the first and the second radical site, the number of unsaturated atoms of the shortest chain being an odd integer.

19. Use of a charge-transporting conjugated donor compound in a combination of
5 a charge-transporting conjugated donor compound and a phosphorescent acceptor compound dispersed in the donor compound, the charge-transporting conjugated donor compound including a structural unit R in accordance with one of the formula



wherein Y is a single bond or a hydrogen, -X- or -X'- is, the same or different, -O-, -S-, -NH-, -CH₂- or -CH₂CH₂- or wherein -X- or -X'- is, the same or different, -CR'R'- wherein
10 -CR'R'- together represent a cyclic structure in which the carbon atom is a spiro atom or wherein -X- or -X'- is, the same or different, -CR'HCR'H- with -CR'-CR'- together representing a ring system, monocyclic or polycyclic, such as fused polycyclic, saturated or aromatic or combination thereof, or wherein -X- or -X'- is, the same or different, a structural
15 unit in accordance with one of the formula



or wherein -X- or -X'- is, the same or different, equal to C₁-C₂₀ dialkylmethylene or -NR¹- with R¹ is C₁-C₂₀ alkyl or C₄-C₁₂ aryl, such as phenyl, and wherein one or more aromatic -CH units may be replaced with respective nitrogen atoms and wherein one or more hydrogen
20 atoms may be replaced with respective non-hydrogen substituents.